Enhancing the Efficiency of Electromagnetic Coil Mechanisms Through Unprecedented Use of Topological Insulators and Novel Hypothesis Concerning Mode of Action of QAH

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Introduction

While great strides have been made in the past ten years toward creating increasingly powerful magnetic fields on the scale of the very small, the creation of powerful magnetic fields on a scale suitable for medical imaging, for instance, is a science which has remained static over that same time-span. The primary limiting factors for the strength of MRI field strength include the amount of available power, the capacity to cool the magnetic coils, the fineness of the wire used, the willingness of care providers to alter structures to shield sensitive electronics from increasingly powerful magnetic fields (oftentimes requiring costly remodeling) as well as the willingness of the customers for such technology to pay more for incremental improvements to medical imaging.

As the developers of medical-grade MRI technology must consider whether there will be a market for upgraded systems, many are choosing to repeatedly defer significant investment in next-generation equipment. A novel paradigm could not only lead to a reduction of the cost of the development of the next-generation MRI technology, but could help to mitigate the cost of cooling the systems, making it more affordable for hospitals to operate MRI machines, generally.

Abstract

Topological insulators, which are being investigated virtually exclusively for their applicability in the area of the design of anti-ferromagnetic structures in support of the manufacture of hard disks of exceptional capacity may have many other applications not promulgated, thus far, by the community at large, including the facilitation of the construction of extremely powerful magnetic field generators which do not require any increase to the customary amount of amperage utilized in present-day systems in order to yield substantial gains in magnetic field strength.

To understand this concept, one needs first to understand why it is that utilizing increasingly thin, increasingly long wires leads to a stronger magnetic field relative to electrical input in electromagnets. The longer a conductive wire in an electromagnet is, the more time the electrons it carries spend in the vicinity of the object to be exposed to the magnetic field. If the same electrons can be made to circulate in the vicinity of the same section of the same object for a longer period of time, the total amount of magnetism conveyed increases. There is a limit to the practical usefulness of endlessly circulating the same electrons as most materials, particularly organic tissues, retain the conferred energy for

extremely short periods of time. In order to take a single snapshot, a short pulse of extreme voltage must be passed through a coil and the consequent radio emissions from the tissues exposed to the field must be measured in the instant after the pulse. These emissions terminate nanoseconds after the field is terminated, but it is only in the period after the field is turned off that useful signals may be detected.

In order to create an electromagnet of a higher order of *efficiency*, topological insulators, which serve to corral electrons toward one side of a material as thin as three atoms in breadth, may be used toward this end through the use of *twisted topological insulator sheets*, which, in addition to forcing electrons to follow a more circuitous path, when combined with a second technology, may be used to increase the rate at which electrons individual emit discrete magnetism as they make their journey through the wire. To understand the best method for achieving this, one must understand that the discrete magnetism associated with a single electron is not a constant, but can vary under specific circumstances. The single factor which dictates the amount of magnetic force which is contributed by any given electron is the velocity of spin of an individual electron on its own axis.

Electrons may flow through various materials at different speeds, but the spin velocity of the electrons is generally unchanged by this factor. However, abrupt alterations to angular momentum may be converted, as per previous publications (ibid.,) into spin as a result of abrupt changes to angular momentum or due to other factors. That particular method of enhancing spin velocity is not suitable for the purposes of this proposal, however.

One must also understand through exactly what sort of mechanism topological insulators constrain electrons to the outer layer of a material whilst inhibiting their diffusion into the interior of the insulator through the QAH effect. Although the physics community considers this to be an open question, the reason for this behavior is the tendency of topological insulators to be able to redirect magneton flux so that the discrete magnetism emitted by electrons flowing through a material boomerang toward those very electrons from distances of up to a few atomic thicknesses and push electrons toward the periphery of the material using the electrons' own magnetic emissions (not unlike the way in which hovercraft blow air toward the ground and the ground deflects that air back toward the bottom of the craft, keeping it from contacting the ground.)

For one thing, this behavior would seem to imply that in contrast with a conventional conductive wire in which the magnetism emitted by the flowing electrons (i.e. those electrons are dipole magnets in and of themselves,) wherein magnetism is emitted both *inward* (toward the object being imaged in the MRI) and *outward* (in the opposite direction, where that magnetism is wasted,) a topological insulator would enable the totality of the emissions from both poles of the electrons to be projected in a single direction, thereby doubling the overall magnetic force emission relative to electrical current strength.

However, this doubling by no means represents the limit of how MRI field strength can be boosted by using twisted topological insulator-based wires rather than copper wires.

For one, the twisted topological insulators would force electrons to follow highly circuitous curlicue-like paths as they travel, which would increase the length of time it takes for electrons to traverse the length of the wire and would thus increase the density of electrons within the wire. Beneficially, the constraining of the electrons to one side of a thin material would reduce electrical impedance, thus reducing the amount of waste heat generated and mitigating but not entirely eliminating the need for active cooling.

From there, a novel mechanism based upon these new understandings may further enhance magnetic output relative to amperage input by taking pains to increase the spin velocity of the electrons. Spin velocity may be enhanced by certain magnetic interactions, extremely transiently by reflection events and it may also be enhanced by surrounding conducted electrons with oscillating Coulomb Force Lines (positive) created by the alignment of a great many protons within a surrounding structure of positive overall charge. These structures can be crystalline and can switch force projection on and off using phononic energy to alter the alignment of crystalline nodes with respect to one another as has been extensively described by a number of authors who seemed uncertain of the best applications for such approaches. While this has already been used to achieve things like bulk quantum entanglement of atoms for the purposes of the construction of revolutionary secure communication devices, such mechanisms have a variety of applications.

When an electron in such a scheme passes through a positive CFL as it travels through the specialized wire, it could be expected to be jolted in directions roughly perpendicular to the overall direction of travel, further lengthening the journey of the electrons while dramatically increasing their spin velocity.

The rapid jog of the electrons when passing through any such CFLs from the original position to the altered position, then back once more to the original position could be predicted to result in the electron simultaneously encountering an enhanced microgravitational environment which would result in enhanced spin. As the electron would also be moved by such a process into an area of enhanced magnetism (i.e. into its own wake,) this could be predicted to have the effect of dramatically enhancing spin. This could also be predicted to generate a number of electron duplication (SASE) events which would further boost the effective strength of the current flowing through the wire. As per previous publication 17 February 2024, three magneton streams converging upon a single point is the mechanism responsible for initial electron formation in the case of simple electrical induction. Thus, in any context in which strong magnetic fields are, as a starting condition, inbound from at least two directions (necessarily true in this case,) causing electrons to hop back and forth between primary and secondary positions via any mechanism (CFL "speedbumps" are as good as any)

could be predicted to have the effect of dramatically increasing the rate of spin of these electrons.

It is difficult to prognosticate the magnitude of this effect, although its impact should be, at minimal, measurable and ideally, should provide a useful further boost to field strength without the need for any additional electrical input. Between the magnetic influx effects and the neutrino influx effects, this author predicts that the neutrino influx effects associated with passage through a (+) CFL would result in the greater boost between the two, although this approach would confer a benefit through a wide variety of effects; some subtle and some quite dramatic; all of which have now been described.

Conclusion

In summation, the replacement of copper wires typically used for medical-grade electromagnets with twisted topological insulators of just a few atomic thicknesses when additionally coupled with a phononically alternated (+) CFL source which bisects the conductive wire in order to provide surplus quantum electrical energy to the electrons through a solid state mechanism could be predicted to enable the user to deliver magnetic fields of 7-8x greater strength relative to electrical current input versus current technology. This system could be predicted to generate about a fifth as much waste heat as existing systems and given these advantages, experimental verification of these suppositions ought to be conducted.